Appl. No.: 10/037,461
Amdt. Dated: February 23, 2004
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The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) An integrated semiconductor device comprising:

a semiconductor substrate;

a laser on the substrate having an active layer and a periodically spaced current-induced grating disposed near the active layer, wherein the periodically spaced current-induced grating modulates gain in the active layer in the direction of light propagation for providing periodic modulation of the gain of the active layer and periodic modulation of a differential refractive index between the different indices of the active layer and of the periodically spaced current-induced grating to determine a wavelength of a light emitted from a laser cavity formed from the length L of the active layer, wherein the light emitted is ~~producing~~ a single-mode output light signal at a data rate greater than 622 Mb/sec in isolator-free operation; and ~~, wherein the grating has a coupling strength product κL greater than 3, where κ is a coupling coefficient and L is a length of the laser cavity~~.

an electrical contact over the periodically spaced current-induced grating for providing current to the grating to control the wavelength of the light emitted from the laser.

2. (currently amended) The semiconductor device of Claim 1 wherein the grating comprises a strong complex-coupled grating having a coupling strength product κL greater than 3, where κ is a coupling coefficient.

3. (original) The semiconductor device of Claim 2 wherein the grating comprises a first semiconductor material overgrown with a second semiconductor material.

4. (original) The semiconductor device of Claim 1 wherein the active layer comprises a multiple quantum well structure.

5. (original) The semiconductor device of Claim 4 wherein the multiple quantum well structure is AlInGaAs.

6. (currently amended) The semiconductor device of Claim 1 wherein the electrical contact provides current to the grating at the data rate of at least ~~is about~~ 2.5 Gb/sec.

7. (original) The semiconductor device of Claim 1 further comprising a modulator on the substrate for modulating the output light.

8. (original) The semiconductor device of Claim 7 wherein the modulator comprises an electroabsorption modulator.

9. (original) The semiconductor device of Claim 7 wherein the modulator comprises a Mach Zehnder modulator.

10. (original) The semiconductor device of Claim 1 wherein the laser comprises a distributed feedback (DFB) laser.

11. (currently amended) A method for fabricating an integrated semiconductor device comprising:

forming on a semiconductor substrate an active layer; and

forming a periodically spaced current-induced grating above the active layer , wherein the periodically spaced current-induced grating modulates gain in the active layer in the direction of light propagation for providing periodic modulation of the gain of the active layer and periodic modulation of a differential refractive index between the different indices of the active layer and

of the periodically spaced current-induced grating to determine a wavelength of a light emitted from a laser cavity formed from the length L of the active layer, wherein the light emitted is ~~to produce a laser cavity emitting~~ a single-mode output light signal at a data rate greater than 622 Mb/sec. in isolator-free operation; and~~, wherein the grating has a coupling strength product κL greater than 3, where κ is a coupling coefficient and L is a length of the laser cavity.~~

forming an electrical contact over the periodically spaced current-induced grating for providing current to the grating to control the wavelength of the light emitted from the laser.

12. (original) The method of Claim 11 wherein the output light has a wavelength of about 1.5 μm.

13. (currently amended) The method of Claim 11 wherein the grating comprises a strong complex-coupled grating having a coupling strength product κL greater than 3, where κ is a coupling coefficient.

14. (original) The method of Claim 11 wherein the grating comprises a first semiconductor material overgrown with a second semiconductor material.

15. (original) The method of Claim 11 wherein the active layer comprises a multiple quantum well structure.

16. (original) The method of Claim 11 wherein the multiple quantum well structure is AlInGaAs.

17. (original) The method of Claim 11 further comprising forming a modulator on the substrate for modulating the output light.

18. (original) The method of Claim 17 wherein the modulator comprises an electroabsorption modulator.

19. (original) The method of Claim 17 wherein the modulator comprises a Mach Zehnder modulator.

20. (currently amended) An optical communication device comprising:

a semiconductor laser having an active layer and a periodically spaced current-induced grating disposed near the active layer, wherein the periodically spaced current-induced grating modulates gain in the active layer in the direction of light propagation for providing periodic modulation of the gain of the active layer and periodic modulation of a differential refractive index between the different indices of the active layer and of the periodically spaced current-induced grating to determine a wavelength of an output light emitted from a laser cavity formed from the length L of the active layer, wherein the output light is ~~producing~~ a single-mode output light signal at a data rate greater than 622 Mb/sec.~~, wherein the grating has a coupling strength product κL greater than 3, where κ is a coupling coefficient and L is a length of the laser cavity~~;

an electrical contact over the periodically spaced current-induced grating for providing current to the grating to control the wavelength of the output light emitted from the laser;

an optical fiber for receiving the output light; and

optics for isolator-free coupling of the output light into the optical fiber.

21. (original) The device of Claim 20 wherein the output light has a wavelength of about 1.5 μm.

22. (currently amended) The device of Claim 20 wherein the grating comprises a strong complex-coupled grating having a coupling strength product κL greater than 3, where κ is a coupling coefficient.

23. (original) The device of Claim 22 wherein the grating comprises a first semiconductor material overgrown with a second semiconductor material.

24. (original) The device of Claim 20 wherein the active layer comprises a multiple quantum well structure.

25. (original) The device of Claim 24 wherein the multiple quantum well structure is AlInGaAs.

26. (currently amended) The device of Claim 20 wherein the electrical contact provides current to the grating at the data rate of at least ~~is about~~ 2.5 Gb/sec.

27. (original) The device of Claim 20 further comprising a modulator integrated with the laser for modulating the output laser light before coupling into the optical fiber.

28. (original) The device of Claim 27 wherein the modulator comprises an electroabsorption modulator.

29. (original) The device of Claim 27 wherein the modulator comprises a Mach Zehnder modulator.

30. (original) The device of Claim 20 wherein the laser comprises a distributed feedback (DFB) laser.

31. (original) The device of Claim 20 wherein the optics for isolator-free coupling comprise at least one lens disposed between the laser and the optical fiber.

32. (original) The device of Claim 31 wherein the optics for isolator-free coupling comprise at least two lenses disposed between the laser and the optical fiber, including a collimating lens and a coupling lens.

33. (original) The device of Claim 31 wherein the at least one lens comprises a fiber lens at an end of the fiber for receiving the output light.